6. Remove corrugations. Operate the spreader to prevent overlap of aggregates. If overlap occurs, remove the excess aggregate before rolling.
7. Ensure a uniform aggregate spread by hand spotting and brooming as necessary.

G. Rolling

Select a rolling pattern and speed that will thoroughly key the aggregate into the bituminous material. The Engineer must approve the pattern and speed.

If a steel wheel roller will fracture the aggregate, use pneumatic-tired rollers only.

H. Brooming

Use a revolving broom as necessary, supplemented by hand brooming, to remove or redistribute excess stone. Take care not to unseat bonded stone when brooming.

I. Controlling Traffic

Do not allow traffic on an individual course until the bituminous material has cooled or set enough to ensure that the aggregates will not be loosened, dislodged, or whipped off by slow-moving traffic.

When traffic is permitted back on the course, the Engineer will determine the speeds and specify the control devices to limit the speed. Continue this control until the Engineer permits the road to be opened for general traffic.

424.3.06 Quality Acceptance

General Provisions 101 through 150.

424.3.07 Contractor Warranty and Maintenance

Maintain and protect the surface course as specified in Section 105 until the Project has been accepted. Make repairs as the Engineer directs. The cost of maintenance, protection, and repair is included in the Unit Prices Bid for the Item for which they apply.

424.4 Measurement

The area to be measured is the number of square yards (meters) of each type surface treatment completed and accepted.

424.4.01 Limits

The length is measured along the surface. The width is specified on the Plans, plus or minus any authorized changes. Irregular areas are measured by the surface square yard (meter) within the lines shown on the Plans or authorized changes.

424.5 Payment

The accepted area of surface treatment will be paid for at the Contract Unit Price per square yard (meter) complete for each type and stone size specified.

Payment will be made under:

Item No. 424	Single surface treatment stone size__group__	Per square yard (meter)
Item No. 424	Double surface treatment stone size__and __ group__	Per square yard (meter)
Item No. 424	Triple surface treatment stone sizes __, __ and __, group__	Per square yard (meter)

424.5.01 Adjustments

If a supplemental agreement is approved, payments will be adjusted as per the Contract Unit Price.

Section 427—Emulsified Asphalt Slurry Seal

427.1 General Description

This work includes placing slurry seal. Emulsified asphalt slurry seal is a thin application of a mixture of fine non-plastic aggregate, emulsified asphalt, mineral filler, and water.

427.1.01 Definitions

General Provisions 101 through 150.

427.1.02 Related References

A. Standard Specifications

Section 413—Bituminous Tack Coat

Section 802—Aggregates for Asphaltic Concrete

Section 822—Emulsified Asphalt

Section 824—Cationic Asphalt Emulsion

Section 830—Portland Cement

Section 882—Lime

Section 883—Mineral Filler

B. Referenced Documents

GDT 91

GDT 43

427.1.03 Submittals

A. Slurry Seal Design

At least two weeks before beginning the work, submit to the Office of Materials and Research (OMR) design samples of each ingredient to be used in the slurry seal mix. Include in the samples information concerning sources, type of materials, and project number. Do not begin slurry seal work until the OMR has approved the slurry mix design.

Submit the slurry seal mix design that will be used on the Project to the Engineer.

B. Equipment Calibration

Before placing slurry seal, furnish the Engineer with a calibration of the slurry mixing equipment.

427.2 Materials

Ensure that the materials to be used meet the following specifications:

A. Aggregate

Ensure that the aggregate used in emulsified asphalt slurry seal meets the requirements of Subsection 802.2.01. Except, use aggregate manufactured from Group II, Class A or B crushed stone or slag with a sand equivalent value of at least 50.

Ensure that the aggregates shipped to the project are uniform and do not require blending or premixing at the storage area before use.

B. Mineral Filler

Material	Section
Portland Cement	830 and 883
Hydrated Lime	882 and 883

C. Emulsified Asphalt

Material	Section
Emulsified Asphalt: SS-1h	822
Cationic Asphalt Emulsion: CSS-1h	824

D. Water

Ensure that water for slurry seal mixtures is clear and free of oil, salt, acid, alkali, organic, and other harmful substances.

The Engineer may require a water sample be sent to the OMR for evaluation before work begins on the Project.

E. Mixture Composition

Use an emulsified asphalt slurry seal that is a uniform mixture of aggregate, emulsified asphalt, mineral filler, and water.

The Engineer may require any element to be adjusted or replaced to produce an acceptable slurry seal. Proportion the elements to produce a uniform mixture that meets the requirements of the Table below:

Emulsified Asphalt Slurry Seal Mixture		
Mixture Control Tolerances, %	Sieve Size	% Passing
±0	3/8 in (9.5 mm)	100
±6	No. 4 (4.75 mm)	90 to 100
±5	No. 8 (2.36 mm)	65 to 90
±4	No. 50 (300 µm)	20 to 45
±3	No. 200 (75µm)	8 to 16
Design Requirements		
±0.75	Range for percent residual asphalt	*7.5 to13.5
±0.2 (5)	Flow inch (mm), GDT 91	1 (25)
N/a	Wear lb/ft² (g/m²)GDT 43 maximum	0.220 (1075)
*Percent residual asphalt is based on weight of the dry aggregate.		

Emulsified asphalt slurry seal is used to seal small cracks and correct moderate surface condition. Apply this type at a rate of 10 to 20 lbs/yd² (5.5 to 11 kg/m²) based on dry aggregate weight.

If more than 20 lbs/yd² (11 kg/m²) of emulsified asphalt slurry seal is required, apply additional lifts of the same mixture.

Maintain the gradation and percent residual asphalt as shown on the slurry seal design or as established by the Engineer within the mixture control tolerances listed.

427.2.01 Delivery, Storage, and Handling

A. Transporting and Storing Asphalt Emulsions

Transport asphalt emulsions using containers free of foreign material. Asphalt emulsion will not be accepted if a transporting vehicle has leaked or spilled during transit.

Store the asphalt emulsion in stationary rail or truck tanks that can be used to fill the slurry seal truck tanks. Equip the storage and truck tanks to prevent water from entering the emulsion. Provide heat if necessary to prevent freezing.

B. Stockpiling Aggregates

Stockpile the aggregate in an area that drains readily. Take precautions to prevent stockpile contaminations such as soil, vegetation, or oversize rock. Load the aggregate on to the slurry seal trucks without segregating it.

427.3 Construction Requirements

427.3.01 Personnel

General Provisions 101 through 150.

427.3.02 Equipment

Equipment, tools, and machines used to perform this work are subject to the Engineer's approval. The Engineer may discontinue the work if more equipment and tools are needed to place the materials. Do not use malfunctioning equipment to perform the work.

A. Slurry Mixing Equipment

Before slurry seal placement begins, furnish the Engineer with a calibration of the slurry mixing equipment. Ensure that the mixing machine is equipped with the following:

- Revolution counter to count the feeder belt revolutions continuously or intermittently as desired by the Engineer
- Water pressure system and a fog-type spray bar to fog the surface prior to spreading the slurry mix

- Continuous flow mixing unit that can deliver a predetermined proportion of aggregate, water, mineral filler, and asphalt emulsion to the mixing chamber and discharge the thoroughly mixed product continuously

Pre-wet the aggregate and mineral filler in the machine immediately before mixing it with the emulsion.

NOTE: Use caution when mixing to ensure that the emulsion does not set up prematurely.

B. Slurry Spreading Equipment

Use a mechanical squeegee spreader with a flexible strike-off that contacts the surface (ensure that the spreader is adjustable to spread evenly and to prevent loss of slurry on varying grades and crowns)

Use a spreader equipped with augers, a steering device, a flexible strike-off, and a device to adjust the coverage width.

Keep the spreader box clean and free of asphalt and aggregate build-up. The type of flexible strike-off and the burlap drags or other drags are subject to the Engineer's approval.

C. Cleaning Equipment

Ensure that power brooms, power blowers, air compressors, water flushing equipment, and hand brooms can thoroughly clean cracks and the old surface.

D. Auxiliary Equipment

Provide hand squeegees, hand brooms, shovels, and other equipment needed to perform the work.

427.3.03 Preparation

Immediately before applying the slurry:

1. Remove loose material, silt spots, vegetation, and other objectionable material from the pavement. If the pavement has considerable cracks, do not flush it with water.
2. Prepare the surface as specified in the Standard Specifications for slurry seal.

427.3.04 Fabrication

General Provisions 101 through 150.

427.3.05 Construction

A. Observe Weather Limitations

Do not apply slurry seal if the pavement or ambient temperature is 55 °F (13 °C) or below and falling. If both the ambient and pavement temperatures are 45 °F (7 °C) or above and rising, the slurry seal may be applied.

If the relative humidity exceeds 80 percent or the weather is overcast, the Engineer will determine when to apply the slurry seal.

B. Apply Tack Coat

Before placing the slurry seal, apply a bituminous tack coat consisting of one part emulsion and three parts water to the old surface as follows:

1. Apply a tack coat with the same asphalt emulsion type and grade as used in the slurry seal.
2. Apply the tack coat according to Section 413.
3. Apply the tack coat with an asphalt distributor.
4. Apply the tack coat at a rate of 0.05 to 0.10 gal/yd² (0.23 to 0.46 L/m²) of the diluted emulsion. The Engineer will determine the exact application rate.

C. Prepare the Mix

Prepare the mix as follows:

1. Thoroughly mix the material proportions approved for use. Do not mix for more than four minutes.
2. Adjust the amount of water or mineral filler to reach the desired consistency.
3. If the proper slurry consistency cannot be maintained, stop the work and correct the problem by changing the proportions or material sources.

D. Apply the Slurry Seal

Place the slurry seal uniformly across the width of the traffic lane unless otherwise specified or directed by a Special Provision in the proposal or the Engineer. Carry enough slurry seal in the spreader to completely cover the surface. Apply the slurry seal as follows:

1. Adjust the squeegee action to permit the mix to flow freely and leave a smooth surface.
2. If local conditions require, pre-wet the surface with water by fogging ahead of the slurry box. Closely control pre-wetting to prevent water runoff or puddling.
3. Do not deposit slurry mixture that is not the desired consistency.
4. After depositing the slurry, do not add additional elements.
5. Prevent the following:
   - Lumping, balling, or unmixed aggregate
   - Segregation of the emulsion and aggregate fines from the coarse aggregate
   - Excessive buildup or unsightly appearance on longitudinal or transverse joints
6. If the coarse aggregate settles to the bottom of the mix, remove the slurry from the pavement.
7. Place longitudinal joints on two-lane roadways as close to the center of the pavement as possible.

   If the roadway has more than two lanes of traffic, place the longitudinal joints as close as possible to where traffic stripes will be placed.

E. Apply by Hand

Use approved squeegees to spread slurry in areas that are not accessible to the slurry spreader. Do not leave unsightly marks from the hand work.

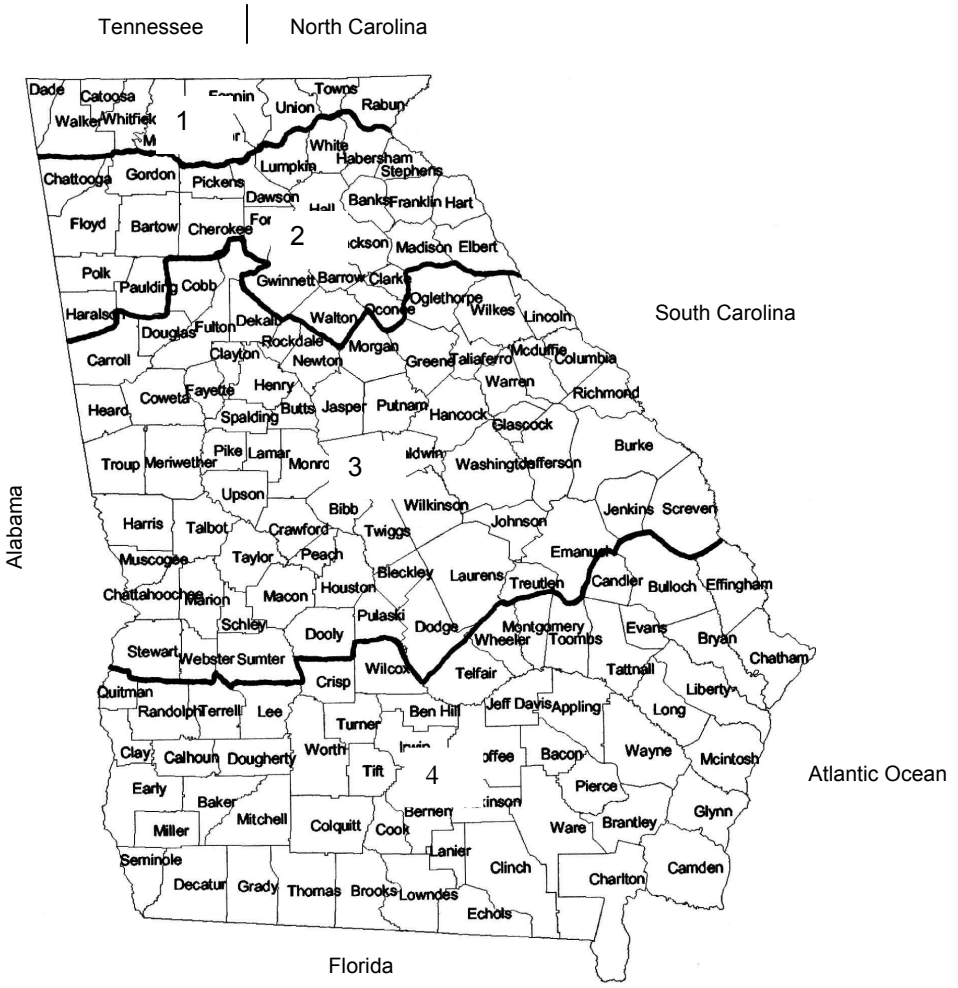
F. Control Traffic

Do not allow traffic on the slurry seal until it has cured enough to withstand marring and tearing, and until no water will be pumped to the surface. Control traffic as necessary to prevent damage to the slurry. Repair any traffic damage to the slurry seal at the Contractor's expense.

G. Observe Seasonal Limitations

Apply slurry seal between the dates given in the Table below. The dates are given by zones shown on the Georgia Geographic Map, below. The Engineer shall authorize any exceptions.

Zones	Dates
1	April 15 – October 1
2	April 10 – October 25
3	April 1 – October 31
4	April 1 – October 31



Georgia Department of Transportation Geographical Map
For Surface Treatment and Slurry Seal

427.3.06 Quality Acceptance

General Provisions 101 through 150.

427.3.07 Contractor Warranty and Maintenance

General Provisions 101 through 150.

427.4 Measurement

Emulsified asphalt slurry seal is measured by the square yard (meter) complete in place and accepted. The lengths and widths to compute square yards (meters) are specified in Section 109.

Diluted emulsified tack coat is measured and paid for according to Section 413.

427.4.01 Limits

General Provisions 101 through 150.

427.5 Payment

Emulsified asphalt slurry seal is paid for at the full Contract Price per square yard (meter) and is full compensation for furnishing materials, including bituminous materials, equipment, work, and labor.

Payment will be made under:

Item No. 427	Emulsified asphalt slurry seal type ___ stone, Group II	Per square yard (meter)

427.5.01 Adjustments

General Provisions 101 through 150.

Section 428—Micro Surfacing

428.1 Description

This work covers the materials, equipment, construction, and application procedures for placing micro-surfacing material for filling ruts and surfacing existing paved surfaces. Properly proportion, mix, and spread all ingredients on the paved surface according to this Specification and as directed by the Engineer.

428.1.01 Definitions

General Provisions 101 through 150.

428.1.02 Related References

A. Standard Specifications

Section 413—Bituminous Prime

Section 424—Bituminous Surface Treatment

Section 824—Cationic Asphalt Emulsion

B. Referenced Documents

GDT 125

428.1.03 Submittals

A. Invoices

When the Department requests, furnish formal written invoices from a supplier for all materials used in production of micro surfacing. Show the following on the invoice(s):

- Date shipped
- Quantity in tons (megagrams)

Purchase LRA-modified emulsion from a supplier who will provide copies of invoices upon the Department's request.

B. Mix Design

Submit the proposed mix design for approval at least two weeks before beginning the mixing operations. As a minimum, the design shall include the following:

- Aggregate test properties
- Aggregate target gradation
- Results of Table 1 mixture design properties
- Design percent asphalt residue based on dry weight of the aggregate
- Mineral filler percentages based on dry weight of the aggregate
- Quantitative effects of moisture content on the unit weight of the aggregate (bulking effect)

Submit to the Office of Materials and Research (OMR) representative samples of each ingredient to be used in the micro-surfacing mixture for design verification at least two weeks before beginning mixing operations.Include information about sources, type of materials, and project number.

Do not begin micro-surfacing work until the OMR has approved the micro-surfacing design and accepted the mixture.

The Engineer's acceptance of the design is solely for quality control and does not release the Contractor from performing acceptable work under this Specification.